

First Discovery of the Lichen-Feeding Moth *Bacotia sakabei* (Lepidoptera: Psychidae) from Korea

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ABSTRACT

The family Psychidae is a small group consisting of 241 genera and 1,350 species in the world. The genus *Bacotia*, belonging to the family Psychidae, what was established by Tutt based on the type species, *Fumea sepium* Speyer and Speyer, 1846. In this study, we aimed to record lichen-feeding bagworms in Korea. The genus *Bacotia* Tutt is reported for the first time from Korea with one newly recorded species, *Bacotia sakabei* Seino, 1981. All available information, including the collecting localities, host plants, illustrations of adults and genitalia are presented. A DNA barcode for precise identification of the species is also described.

Keywords: *Bacotia*, Psychidae, Lepidoptera, new record, Korea

INTRODUCTION

The family Psychidae is a relatively small group consisting of 241 genera and 1,350 species worldwide (Sobczyk, 2011; Van Nieukerken et al., 2011). A total of seven species from this family had been recorded from Korea (Park, 1983; Byun et al., 1996, 2009). In 2016, Roh et al. (2016) revised the Korean species of Psychidae, with the inclusion of a new species, *Psyche yeongwolensis* Byun and Roh, and a newly recorded species, *Proutia maculatella* Saigusa and Sugimoto. Subsequently, Roh and Byun (2016) added a further newly recorded species, *Ceratosticha leptodeta* Meyrick, 1935. Consequently, a total of 10 species are now known from Korea.

The genus *Bacotia*, belonging to the family Psychidae, was established by Tutt (1899) based on the type species *Fumea sepium* Speyer and Speyer, 1846. Seino (1981) described a new species, *B. sakabei*, from Japan. Later, *B. sepium* was synonymized with *B. claustrilla* by Leraut (1984). Dierl (1964) described a new species of *Bacotia*, *B. nepalica*, from Nepal. Thus, a total of three species of *Bacotia* have been recorded worldwide to date (Sobczyk, 2011; Saigusa and Sugimoto, 2013).

In this study, we report a newly recorded species of the genus *Bacotia*, *B. sakabei*. All available information relating to the collecting localities, host plants, and illustrations

of adults and genitalia are presented, and we also describe DNA barcode data for precise identification of the species.

Materials examined in the present study are preserved in the Systematic Entomology Laboratory, Hannam University (SELHNU), Daejeon, Korea. Male genitalia were dissected and examined after mounting with glycerol solution and euparal solution for identification of the species. Photographs of adults and genitalic structures of the species were taken using a Pax cam digital camera (PAXcam Microscope Cameras Co., Chicago, IL, USA) attached to a Carl Zeiss Axio Imager A1 microscope (Carl Zeiss Ltd., Cambridge, MA, USA).

Genomic DNA was extracted from the legs of a dried specimen in 100% alcohol or larval tissue using a Genomic Cell/Tissue Spin Mini Kit (Mbiotech, Inc., Hanam, Korea), according to the manufacturer's protocol. A 658-bp fragment of the mitochondrial cytochrome c oxidase I (*COI*) gene was amplified using the primer pair LepF1 (attcaaccaatcataagatattgg)/LepR1 (taaaacttctggatgtccaaaaatca) (Hebert et al., 2004). Polymerase chain reaction conditions for amplification were as follows: 94°C for 5 min, 5 cycles at 94°C for 30 s/45°C for 30 s/72°C for 1 min, 40 cycles at 94°C for 30 s/51°C for 30 s/72°C for 1 min, and 72°C for 7 min. Contigs were assembled using CodonCode aligner version 2.0.6 (CodonCode Co., Centerville City, MA, USA) and were aligned by using MAFFT (Katoh and Toh, 2008).

SYSTEMATIC ACCOUNTS

Order Lepidoptera Linnaeus, 1758
Family Psychidae Boisduval, 1829
Subfamily Psychinae Boisduval, 1840

Genus *Bacotia* Tutt, 1899
(type species: *Fumea sepium* Speyer and Speyer, 1846)

¹**Bacotia sakabei* Seino, 1981 (Figs. 1-3)

¹**Bacotia sakabei* Seino, 1981: 121. Type locality: Japan.

Material examined. Korea: 1 ♀, Daejeon: Dong-gu, Isadong, 36°17'28.30"N, 127°27'5.71"E, 288 m, 24 Sep 2015,

Roh SJ; 1 ♂ 1 ♀, Gyeongsangbuk-do: Gimcheon-si, Bongsan-myeon, 36°11'59.39"N, 128°0'2.26"E, 474 m, 24 Oct 2014, Roh SJ, Jeon BS, Kim DS; 1 ♂, Jeollanam-do: Boseong-gun, Miryeok-myeon, 34°48'52.25"N, 127°7'32.13"E, 150 m, 28 Oct 2015, Roh SJ-coll. SEL/HNU.

Adult. Male (Fig. 1A, B): Wingspan 11.5–12.7 mm. Coloration and vestiture: sclerites on head and thorax reddish-brown. Head clothed with short dark brown hairs; vertex and frons covered with tufted scales. Thoracic notum dark brown. Forewings densely covered with dark brown scales; apical margin of scales usually produced into 2 to 4 weakly rounded laciniations. Hindwings covered with dark brown scales; scales slightly narrower than forewing scales, post-marginal part present with long brown hairs. Structure: head

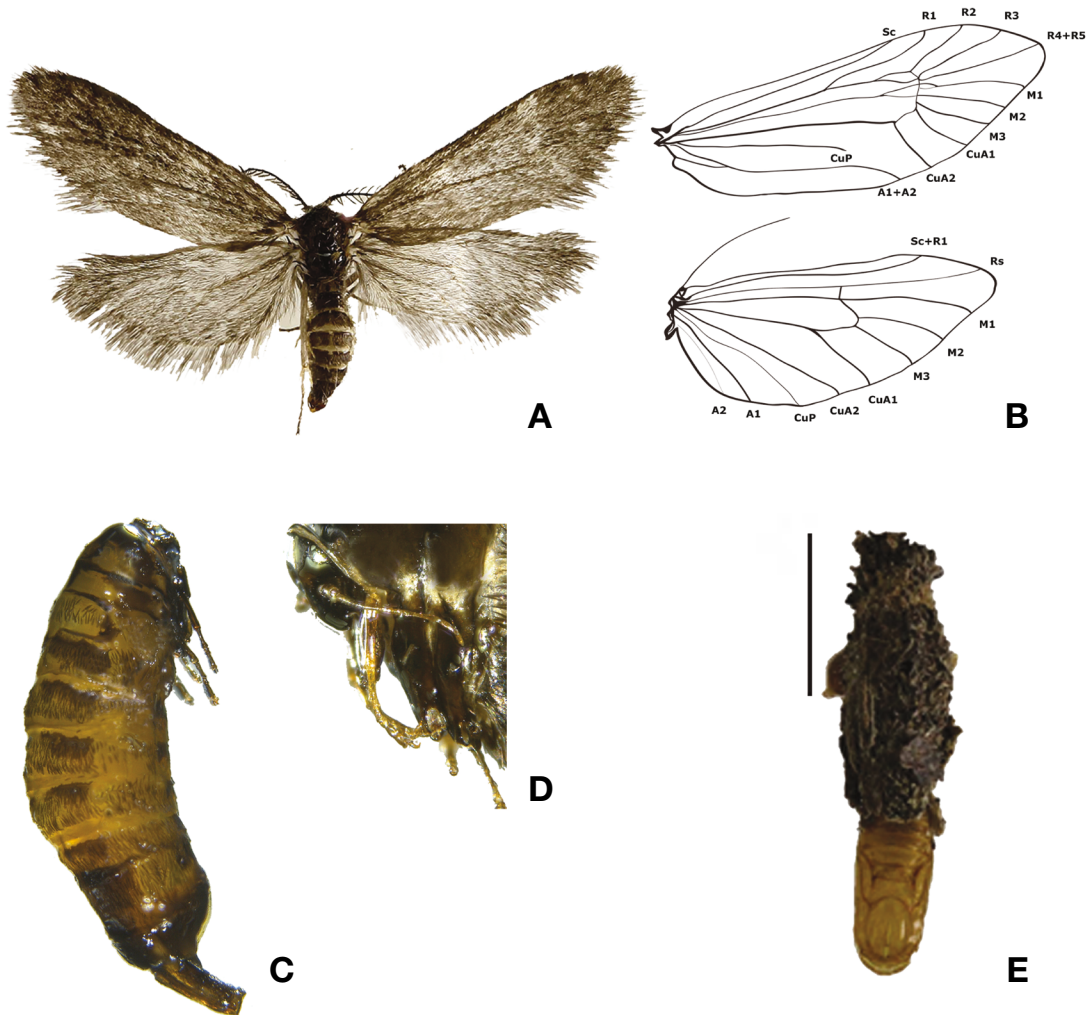


Fig. 1. *Bacotia sakabei*. A, Male; B, Wing venation of male; C, Female; D, Ditto, head and thorax part; E, Larval case. Scale bar: E=5 mm.

Korean name: ¹*가을주머니나방 (신칭)

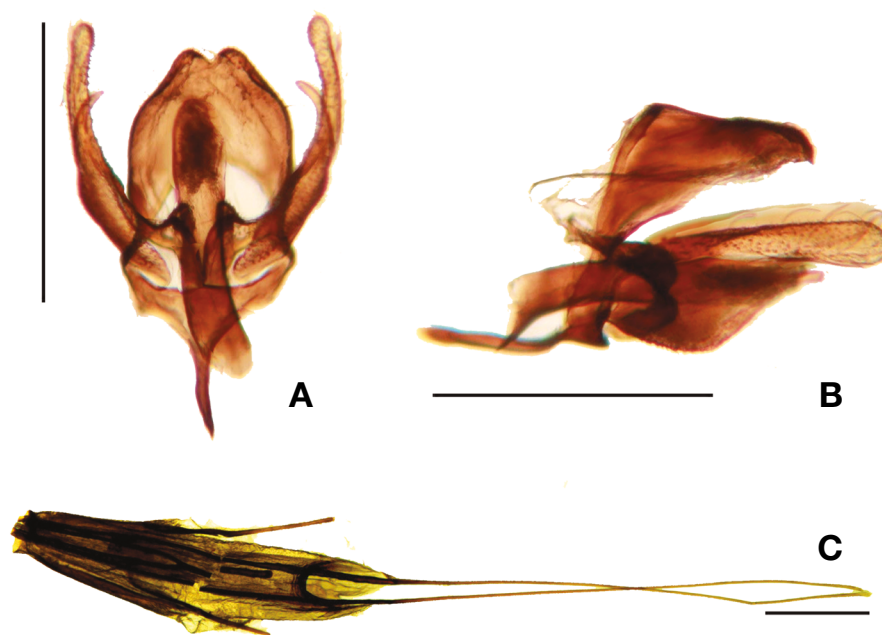


Fig. 2. Genitalia. A, Male; B, Ditto, lateral aspect; C, Female. Scale bars: A–C=0.5 mm.

relatively small, compound eyes relatively large; interocular index 0.67; ocelli absent; labial palpi short and 1-segmented. Antennae as long as half of forewing, basal flagellomeres 20-segmented with pectination. Forewing relatively narrow; costa straight and slightly curved beyond 4/5; termen straightly arched to posterior margin. Wing venation: Median cell 0.66 times as long as wing, intercalary cell present; Sc terminating at 2/3 costa; R_1 originating at axillary area; R_2 , R_3 stalked at 2/3 corner of anterior part of the cell; $R_4 + R_5$ originating at corner of anterior part of the cell and reaching to the apex; M_1 , M_2 originating at intercalary cell; M_2 and M_3 parallel to termen; CuA_1 and CuA_2 closed to posterior margin. Hindwing right-angled triangular shape; costa straight, apex straightly curved; median cell 0.56 times as long as wing; Sc + R_1 straight to 4/5 costa; Rs terminating at apex; M_1 originating at corner of anterior part of the cell, M_2 , M_3 arising from distal margin of median cell; CuA_1 stalked at posterior margin of median cell. Legs covered with brown scales, sclerites on femora and tibiae reddish brown but tibiae of hind legs light gray, tarsi and claws reddish brown.

Female (Fig. 1C, D): 6.4 mm in length. Coloration: Head dark brown and shiny on vertex. Meso and metanotum dark brown. Membranous areas of abdomen brown. Abdomen densely covered with yellowish brown scales; corethrogyne light yellow. Structure: head relatively small, directly ventral aspect and surface with rounded dorsal margin. Length of antennae 0.3 mm filiform. Legs well developed, relatively

long, tarsi 4-segmented. Corethrogyne tufted hairs yellowish brown.

Male genitalia (Fig. 2A, B). In lateral aspect, dorsum relatively wide, uncus slightly hooked. Saccus slender 0.54 times height of ring. Ampulla club-shaped apically with several hairs, harpe short and slender. Anellus gently curved. In ventral aspect, uncus concave; gnathos absent; apex of tegumen gentle; valva narrow, apical part of valva branched with harpe. Juxta absent; saccus elongated, narrow basally; aedeagus short and thick, 0.4 times the height of the genitalia.

Female genitalia (Fig. 2C). Papillae analis slightly narrow. Apophysis anterioris relatively short. Apophysis posterioris very long and slender, 6.5 times longer than apophysis anterioris.

Larval case (Fig. 1E). 8 mm in length. Attached larvae feed on a few large particles of lichen and bark material (Seino, 1981).

Distribution. Korea (new record), Japan.

Host plant (Fig. 3). Lichen on bark and walls (Seino, 1981; Saigusa and Sugimoto, 2013).

DNA barcode. A *COI* gene (cytochrome c oxidase subunit I) sequence was extracted and sequenced (Genbank accession No. KY247098).

Remarks. This species reported to be emerged from late October to early December, unlike other species in the genus (Seino, 1981). It is same to the Japanese species such as the time of appearance, biological characteristics and genitalic structure for this species (Seino, 1981).

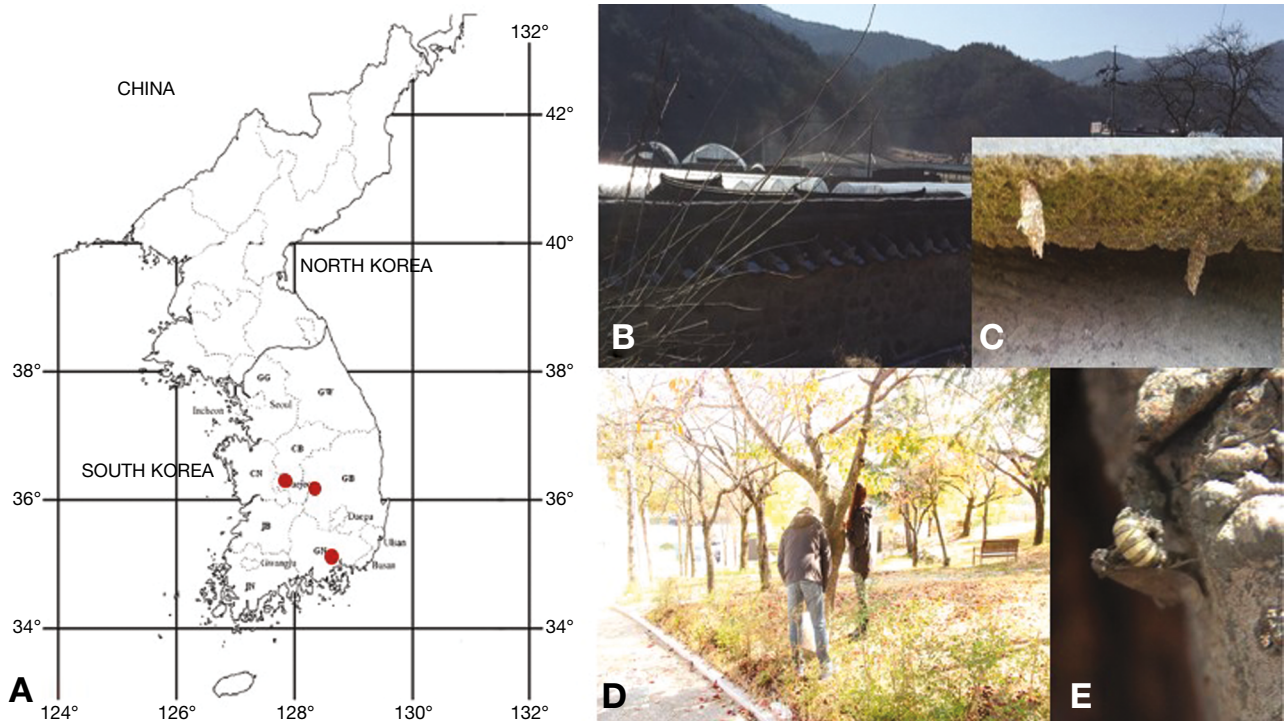


Fig. 3. Distributional map and microhabitats. A, Distributional map; B, Microhabitat (type 1); C, Ditto; D, Microhabitat (type 2); E, Ditto, mating.

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